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L13

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Search Results - Record(s) 1 through 5 of 5 returned.☐ 1. Document ID: US 6069219 A

L13: Entry 1 of 5

File: USPT

May 30, 2000

DOCUMENT-IDENTIFIER: US 6069219 A

TITLE: Energy-curable cyanate/ethylenically unsaturated compositions

US PATENT NO. (1):
6069219Detailed Description Text (99):

The adhesives of the invention useful in electronic applications (referred to as electronic adhesives) may be produced by combining an effective amount (preferably 20 to 80 weight percent, more preferably 30 to 70 weight percent, and most preferably 40 to 60 weight percent of the total composition) of a cyanate ester monomer or oligomer, a curing catalyst for the cyanate ester, an effective amount (preferably 80 to 20 weight percent, more preferably 70 to 30 weight percent, and most preferably 60 to 40 weight percent of the total composition) of an ethylenically unsaturated monomer or prepolymer, a free radical generating curative, and various desirable additives such as electrically conductive particles, thermoplastics, and coupling agents. Combinations of cyanate ester resins and ethylenically unsaturated resins (monomers or partially polymerized resins) are chosen such that a homogeneous solution is obtained which has a viscosity suitable (preferably 300 to 20,000 cps, most preferably 500 to 4000 cps) for coating operations. The catalyst system of organometallic curative and free radical generators may be activated thermally or photochemically or in any combination. It is preferred that one of the catalysts be photochemically activated and the other be thermally activated. Most preferably, the cyanate ester curative is a thermally activated catalyst such as $[\text{CpFe}(\text{CO})_2]_2$, wherein Cp is cyclopentadienyl, and the free radical generator is a photoactive material such as benzildimethyl ketal. The adhesive can be coated by standard techniques between two release liners, such as polypropylene or silicone treated polyester, and the ethylenically unsaturated resin is cured by the application of heat or, preferably, light to give an adhesive film wherein the cyanate portion remains as a thermosettable resin. When the ethylenically unsaturated resin component of the film is photochemically cured, at least one of the release liners must be transparent to the wavelength of light used to effect the cure. Alternatively, the compositions may be coated onto a single release liner and thermally or photochemically cured under an inert, oxygen free atmosphere such as nitrogen. It is preferred that no solvents are used in the coating and processing of the electronic adhesive of the invention. In use, the adhesive film, which may be tacky or non tacky depending upon the resins chosen, is placed between the surfaces to be bonded, such as flex circuitry and printed circuit boards, and laminated by the application of heat and pressure. Electrical contact may be made by metallic features on the substrates to be bonded which protrude through the adhesive film during the bonding step (as with a "bumped" chip). Alternatively, the adhesive can be loaded with electrically conductive particles as described in U.S. Pat. No. 5,143,785, col. 7, line 58 to col. 8, line 15, which is incorporated herein by reference, such that no electrical conductivity is possible in the plane of the film but electrical conductivity is provided through the thickness of the film; such materials are referred to as Z-axis Films (ZAF). Any of several electrically conductive particle types may be used in the invention and are selected based on the intended application. Examples of useful particle types include metalized plastic spheres, solid metal particles, precious metal coated metal particles, solder particles and graphite powders. Particles having diameters in the range of 2-30 micrometers are preferred with 10-20 micrometer diameters being most preferred. Particle loadings in the range of 1-25% by volume of the adhesive are preferred with 2-10% as the most preferred range. Acrylates are the preferred

ethylenically unsaturated monomers and isooctyl acrylate, isobornyl acrylate, phenoxyethyl acrylate, butyl acrylate, 2-(2-ethoxyethoxy)ethyl acrylate, cyclohexyl acrylate, tetrahydrofurfuryl acrylate, and hexyl methacrylate are particularly useful. Because polyimide flex circuitry is of great importance in the electronics industry, adhesion to polyimide is critical. It is thus desirable to incorporate acrylates containing basic or nitrogenous functionality such as dimethyl acrylamide, N-vinyl caprolactam, butyl carbamoyl ethyl acrylate, t-octyl acrylamide, N-iso-butoxymethyl acrylamide, cyclohexylmaleimide, and N-t-butylacrylamide into the electronic adhesive compositions to promote adhesion to polyimide substrates. It may also be desirable to incorporate di- or polyfunctional acrylates such as 1,6-hexanediol diacrylate, neopentyl glycol diacrylate, pentaerythritol tetraacrylate, pentaerythritol triacrylate, urethane acrylate CN 962.TM. from Sartomer Co., urethane methacrylate CN 974.TM. from Sartomer Co., epoxy acrylate CN 104.TM. from Sartomer Co., and polybutadiene diacrylate to partially crosslink the acrylate portion of the composition. Preferred cyanate ester resins are bisphenol based materials such as B-10.TM., B-30.TM., L-10.TM., M-20.TM., and RTX-366.TM. all available from Ciba-Geigy, polycycloaliphatic derivatives such as Quatrex-7187.TM. available from Dow Chemical, and cyanated novolak resins such as Primaset.TM., PT-30.TM., PT-60.TM., and PT-90.TM. available from Allied-Signal Corporation. Preferred cyanate ester resins include B-30.TM., M-20.TM., RTX-366.TM. (all available from Ciba-Geigy) and Quatrex-7187.TM. (Dow) is most preferred. The relative amounts of cyanate ester resin and ethylenically unsaturated resin used in the electronic adhesive will determine the properties of the adhesive. Combined amounts of cyanate ester resin and polyfunctional ethylenically unsaturated resin in the range of 20 to 70 percent by weight will provide reworkable bonds, that is bonds which may be debonded by application of heat followed by solvent treatment without damage to the electronic components such that the parts can be rebonded and electrical contact established, and high levels of cyanate ester resins will provide permanent bonds. Preferably combined amounts of cyanate ester resin and polyfunctional ethylenically unsaturated resin are present in the range of 30 to 60 weight percent. Properties of the electronic adhesives are dictated by the application for which they are intended.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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☐ 2. Document ID: US 6042933 A

L13: Entry 2 of 5

File: USPT

Mar 28, 2000

DOCUMENT-IDENTIFIER: US 6042933 A

TITLE: Electric circuit device having circuit conductors using an electroconductive paste

US PATENT NO. (1):
6042933

Detailed Description Text (114):

Then, 8 parts of the resulting solventless mixed resin and 0.04 part of benzyldimethylamine as a curing accelerator were added to 100 parts of the electroconductive composite metal powders obtained in Example 1 and mixed uniformly to give an electroconductive paste. The properties were evaluated in the same manner as described in Example 1.

Detailed Description Text (149):

An electroconductive paste was prepared by mixing uniformly 100 parts of the electroconductive composite metal powders obtained in Example 1, 10 parts of bisphenol A liquid epoxy resin (Epikote 828, a trade name, mfd. by Yuka Shell Co., Ltd.), 0.3 part of imidazole as a curing agent, and 5 parts of butyl Cellosolve as a solvent. Properties were evaluated in the same manner as described in Example 1.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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☐ 3. Document ID: US 6030553 A

L13: Entry 3 of 5

File: USPT

Feb 29, 2000

DOCUMENT-IDENTIFIER: US 6030553 A
TITLE: Polymer thick film resistor pastes

US PATENT NO. (1):
6030553

Brief Summary Text (3):

The present invention relates in general to polymer thick film compositions. More particularly, it relates to solventless, UV hardenable, thermally curable resistor paste compositions.

Brief Summary Text (11):

The above object is achieved by providing a solventless, UV hardenable, thermally curable resistor paste composition, which comprises (a) 100 parts by weight of a cycloaliphatic epoxy resin; (b) 1-10 parts by weight of a cationic photoinitiator; (c) 1-5 parts by weight of a thermal cure catalyst; (d) 1-90 parts by weight of electrically conductive particles, and optionally (e) 1-20 parts by weight of a reactive diluent.

Brief Summary Text (13):

According to another feature of the invention, the solventless formulation eliminates the dimensional stability problems caused by solvent evaporation. The resistor paste composition may include a reactive diluent to decrease the viscosity, if necessary. The reactive diluent which does not evaporate and is hardened during thermal curing, substantially retaining the resistor shape through the curing process.

Detailed Description Text (3):

A polymer thick film resistor paste having the components (and their parts by weight) listed in Table 1 below, was prepared as follows. At the outset, a resin mixture was first prepared at room temperature by mixing the cycloaliphatic epoxy resin, photoinitiator, thermal cure catalyst, and reactive diluent. In a kneader the resin mixture was then blended with carbon black particles which had been pre-treated by a binder and a coupling agent. The resulting resistor paste was screen printed onto a substrate provided with metal electrodes. The uncured resistor pattern was first exposed to UV radiation (400 w/in) for surface hardening, and then subjected to heating at 120.degree. C. for one hour and 200.degree. C. for another hour for full curing. The resulting resistor exhibited a volume resistivity of 24 ohm-cm at room temperature.

Detailed Description Text (5):

A polymer thick film resistor paste having the components (and their parts by weight) listed in Table 2 below, was prepared as follows. A resin mixture was first prepared at room temperature by mixing the cycloaliphatic epoxy resin, photoinitiator, thermal cure catalyst, and reactive diluent. In a kneader the resin mixture was then blended with carbon black particles and silver particles, both of which had been pre-treated by a binder and a coupling agent. The resistor paste thus produced was screen printed onto a substrate provided with metal electrodes. The uncured resistor pattern was exposed to UV radiation to for surface hardening, and then heated for full curing. The resulting resistor exhibited a volume resistivity of 4 ohm-cm at room temperature.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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☐ 4. Document ID: US 5840432 A

L13: Entry 4 of 5

File: USPT

Nov 24, 1998

DOCUMENT-IDENTIFIER: US 5840432 A

TITLE: Electroconductive paste

US PATENT NO. (1):5840432Detailed Description Text (115):

Then, 8 parts of the resulting solventless mixed resin and 0.04 part of benzyldimethylamine as a curing accelerator were added to 100 parts of the electroconductive composite metal powders obtained in Example 1 and mixed uniformly to give an electroconductive paste. The properties were evaluated in the same manner as described in Example 1.

Detailed Description Text (150):

An electroconductive paste was prepared by mixing uniformly 100 parts of the electroconductive composite metal powders obtained in Example 1, 10 parts of bisphenol A liquid epoxy resin (Epikote 828, a trade name, mfd. by Yuka Shell Co., Ltd.), 0.3 part of imidazole as a curing agent, and 5 parts of butyl Cellosolve as a solvent. Properties were evaluated in the same manner as described in Example 1.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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☐ 5. Document ID: US 4496475 A

L13: Entry 5 of 5

File: USPT

Jan 29, 1985

DOCUMENT-IDENTIFIER: US 4496475 A

TITLE: Conductive paste, electroconductive body and fabrication of same

US PATENT NO. (1):4496475Detailed Description Text (19):

In a highly advantageous embodiment of the invention, the conductive paste contains an organic binder from which the matrix of organic material of an electroconductive body made from the paste is formed. In such body, silver-coated inorganic non-metallic particles and silver particles are embedded in this matrix. The organic binder suitably comprises an inert organic material or materials formable into the matrix; the binder imparts to the paste the proper rheology, for instance, an appropriate consistency for application on a substrate by screening, painting (e.g., electrostatically or with a brush), dipping (following rack loading), continuous machine dipping, and the like. Typically, the organic binder contains one or more resins and one or more solvents to give the paste the desired consistency, but in some embodiments the binder is solventless. Examples of suitable substances are low molecular weight aliphatically unsaturated organic polymers, or a mixture of an aliphatically unsaturated organic polymer and a copolymerizable aliphatically unsaturated organic monomer, such as styrene. These substances, illustratively, have a viscosity of from about 50 to 10,000 centipoises at 25.degree. C. Additional examples are: low molecular weight polyimides containing acrylamide unsaturation, for instance as described in U.S. Pat. No. 3,535,148, granted Oct. 20, 1970 to Abraham Ravve; low molecular weight polyesters containing acrylic unsaturation, such as shown in U.S. Pat. No. 3,567,494, granted Mar. 2, 1971, to Chester W. Fitko; acrylate esters, and methacrylic esters of polyhydric alcohols, for instance as set forth in U.S. Pat. Nos. 3,551,246 and 3,551,235, granted

Dec. 29, 1970 to Robert W. Bassemir et al. (see also U.S. Pat. No. 3,551,311, granted Dec. 29, 1970 to Gerald I. Nass et al.); acrylate and methacrylate esters of silicone resins; malamine; epoxy resins; allyl ethers of polyhydric alcohols; allyl esters of polyfunctional aliphatic and aromatic acids; low molecular weight maleimido substituted aromatic compounds; cinnamic esters of polyfunctional alcohols; mixtures of two or more of the foregoing; and the like. Further examples are unsaturated polymers, such as polyesters from glycols and .alpha., .beta.-unsaturated dicarboxylic acids, for instance maleic and fumaric acids, either with or without other dicarboxylic acids free of .alpha., .beta.-unsaturation, for instance phthalic, isophthalic and succinic acids, dissolved in a copolymerizable aliphatically unsaturated organic solvent, such as styrene, vinyl toluene, divinyl benzene, methyl methacrylate, or mixtures of such solvents; such systems are set forth in U.S. Pat. No. 2,673,151, granted Mar. 23, 1954 to Howard L. Gerhart and U.S. Pat. No. 3,326,710, granted June 20, 1967 to Mary G. Brodie. Some other examples are unsaturated organosiloxanes of from 5 to 18 silicon atoms, and such siloxanes in combination with a vinylic organic monomer. Illustratively, the organic binder is an acrylic resin or an epoxy resin. Examples of suitable acrylic resins are methacrylate polymers. Examples of suitable epoxy resins are any monomeric, dimeric, oligomeric or polymeric epoxy material containing one or a plurality of epoxy functional groups, for instance bisphenol-A and diglycidyl ether. Suitable solvents are coal tar hydrocarbons, chlorinated hydrocarbons, ketones, esters, ether alcohols and ether esters. Examples are xylene, toluene, methylethyl ketone and alcohols, such as aliphatic alcohols of up to 20 carbon atoms, for instance ethanol and propanol. The binder may also contain various common additives such as catalysts and substances which sensitize the binder to radiation, for example, ultraviolet radiation. The sensitizers, for example, are suitably incorporated in small amounts, such as 0.5 to 5% by weight of the binder. Examples are ketones, such as benzophenone, acetophenone, and the like, benzoin and substituted benzoin, thiourea and aromatic disulfides; also examples are azides, thioketones and mixtures thereof. The binder is incorporated in the paste in an amount suitable to impart the above-discussed desired rheology, for instance in an amount up to 35 to 40% by weight of the paste, sometimes as low as 15%, and occasionally even down to from 5 to 10%, by weight of the paste.

Detailed Description Text (25):

Typical techniques and conditions for forming the matrix from the organic binder are: air-drying of the paste at room or elevated temperature; heating of the paste up to a temperature of about 350.degree. C. for a time sufficient for matrix formation, ultraviolet irradiation of the paste; catalyzed curing of the paste at a temperature within a range suitable for operation with the selected catalyst. Other commonly practiced methods for forming, for instance curing, the organic binder into a matrix are also suitable. The resultant matrix is an organic material produced by the action of the selected forming technique and/or conditions. Thus, the organic matrix is suitably a material formed from a resin or resins, as previously described, in the organic binder, such resin or resins being polymerized, cross-linked, or the like to make up the matrix. It will be understood that the technique and conditions selected for forming of the matrix are dependent on the type of organic binder employed and that such technique and conditions should cause formation of a suitable matrix without deforming the silver-coated inorganic non-metallic particles and silver particles, or otherwise altering the components of the system, so as to impede performance of the electroconductive body.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments |
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| 4 | 39 | 118/\$.ccls. and 101/127.ccls. | USPAT | 2003/01/23 09:59 |
| 5 | 4643 | 101/114-129.ccls. | USPAT | 2003/01/23 10:18 |
| 6 | 22 | 101/114-129.ccls. and clean\$ near2 squeegee | USPAT | 2003/01/23 10:02 |
| 7 | 20 | 101/114-129.ccls. and clean\$ near2 (doctor or blade) | USPAT | 2003/01/23 10:02 |
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| 10 | 19 | 5669970.URPN. | USPAT | 2003/01/23 10:15 |
| 11 | 2 | ("Re34615" "5522929").PN. | USPAT | 2003/01/23 10:16 |
| 14 | 2 | 5649479.URPN. | USPAT | 2003/01/23 10:16 |
| 15 | 6 | ("4273042" "5022320" "5201452" "5239923" "5245922" "5275098").PN. | USPAT | 2003/01/23 10:17 |
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| 18 | 13 | ((silk near1 screen) or stencil) and (squeegee or doctor or blade) near2 clean\$ near5 (paste or ink or solder) | USPAT | 2003/01/23 10:29 |
| 19 | 31 | ("6491204" or "6352334" or "6263536" or "5845570" or "5747395" or "5724888" or "5694840" or "5671675" or "5642672" or "5476043" or "5403649" or "5282416" or "5227223").uref. | USPAT | 2003/01/23 10:28 |
| 20 | 70 | ((silk near1 screen) or stencil) and (squeegee or doctor or blade) near2 clean\$ | USPAT | 2003/01/23 10:48 |
| 21 | 57 | ((silk near1 screen) or stencil) and (squeegee or doctor or blade) near2 clean\$ not (((silk near1 screen) or stencil) and (squeegee or doctor or blade) near2 clean\$ near5 (paste or ink or solder)) | USPAT | 2003/01/23 10:30 |
| 22 | 46 | ((silk near1 screen) or stencil) and (squeegee or doctor or blade) near2 wipe | USPAT | 2003/01/23 10:49 |